WIKIPEDIA

Silver iodide

Silver iodide is an inorganic compound with the formula AgI. The compound is a bright yellow solid, but samples almost always contain impurities of metallic silver that give a gray coloration. The silver contamination arises because AgI is highly photosensitive. This property is exploited in silver-based photography. Silver iodide is also used as an antiseptic and in cloud seeding.

Contents

Structure

The structure adopted by silver iodide is temperature dependent:[2]

- Below 420 K, the β-phase of AgI, with the wurtzite structure, is most stable. This phase is encountered in nature as the mineral iodargyrite.
- Above 420 K, the α-phase becomes more stable. This motif is a body-centered cubic structure which has the silver centers distributed randomly between 6 octahedral, 12 tetrahedral and 24 trigonal sites.[3] At this temperature, Ag^+ ions can move rapidly through the solid, allowing fast ion conduction. The transition between the β and α forms represents the melting of the silver (cation) sublattice. The entropy of fusion for α-AgI is approximately half that for sodium chloride (a typical ionic solid). This can be rationalized by considering the AgI crystalline lattice to have already "partly melted" in the transition between α and β polymorphs.
- A metastable γ-phase also exists below 420 K with the zinc blende structure.

The golden-yellow crystals on this mineral sample are iodargyrite, a naturally occurring form of β-AgI.

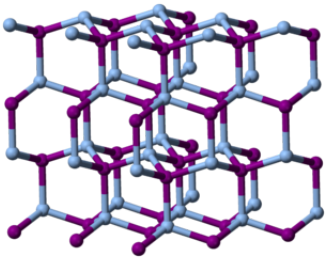
Preparation and properties

Silver iodide is prepared by reaction of an iodide solution (e.g., potassium iodide) with a solution of silver ions (e.g., silver nitrate). A yellowish solid quickly precipitates. The solid is a mixture of the two principal phases. Dissolution of the AgI in hydroiodic acid, followed by dilution with water precipitates β-AgI. Alternatively, dissolution of AgI in a solution of concentrated silver nitrate followed by dilution affords α-AgI.[4] If the preparation is not conducted in the absence of sunlight, the solid darkens rapidly, the light causing the reduction of ionic silver to metallic. The photosensitivity varies with sample purity.

Cloud seeding

The crystalline structure of β-AgI is similar to that of ice, allowing it to induce freezing by the process known as heterogeneous nucleation. Approximately 50,000 kg are used for cloud seeding annually, each seeding experiment consuming 10–50 grams.[5] (see also Project Stormfury)

Silver iodide



Names	
Other names Silver(I) iodide	
Identifiers	
CAS Number	7783-96-2 (http://www.commonchemistry.org/ChemicalDetail.aspx?ref=7783-96-2) ✓
3D model (JSmol)	Interactive image (https://chemapps.stolaf.edu/jmol/jmol.php?model=%5BAg%5DI)
ChemSpider	22969 (http://www.chemspider.com/Chemical-Structure.22969.html) ✓
ECHA InfoCard	100.029.125 (https://echa.europa.eu/substance-information/-/substanceinfo/100.029.125)
EC Number	232-038-0
PubChem CID	6432717 (https://p

Cessna 210 equipped with a silver iodide generator for cloud seeding

Safety

Extreme exposure can lead to argyria, characterized by localized discoloration of body tissue.[6]

References

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2. Binner, J. G. P.; Dimitrakis, G.; Price, D. M.; Reading, M.; Vaidhyanathan, B. (2006). "Hysteresis in the β–α Phase Transition in Silver Iodine" (http://www.sump4.com/publications/paper047.pdf) (PDF). *Journal of Thermal Analysis and Calorimetry*. **84** (2): 409–412. CiteSeerX 10.1.1.368.2816 (https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.368.2816). doi:10.1007/s10973-005-7154-1 (https://doi.org/10.1007%2Fs10973-005-7154-1).
3. Hull, Stephen (2007). "Superionics: crystal structures and conduction processes" (http://stacks.iop.org/RoPP/67/1233). *Rep. Prog. Phys*. **67** (7): 1233–1314. doi:10.1088/0034-4885/67/7/R05 (https://doi.org/10.1088%2F0034-4885%2F67%2F7%2FR05).
4. O. Glemser, H. Saur "Silver Iodide" in Handbook of Preparative Inorganic Chemistry, 2nd Ed. Edited by G. Brauer, Academic Press, 1963, NY. Vol. 1. p. 1036-7.
5. Phyllis A. Lyday "Iodine and Iodine Compounds" in Ullmann's Encyclopedia of Industrial Chemistry, Wiley-VCH, Weinheim, 2005. doi:10.1002/14356007.a14_381 (https://doi.org/10.1002%2F14356007.a14_381)
6. "Silver Iodide" (http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+2930). *TOXNET: Toxicogy Data Network*. U.S. National Library of Medicine. Retrieved 9 March 2016.

	ubchem.ncbi.nlm.nih.gov/compound/6432717)
UNII	81M6Z3D1XE (https://fdasis.nlm.nih.gov/srs/srsdirect.jsp?regno=81M6Z3D1XE) ✓
CompTox Dashboard (EPA)	DTXSID0064836 (https://comptox.epa.gov/dashboard/DTXSID0064836)
InChI	
InChI=1S/Ag.HI/h;1H/q+1;/p-1 ✓ Key: MSFPLIAKTHOCQP-UHFFFAOYSA-M ✓	
InChI=1/Ag.HI/h;1H/q+1;/p-1 Key: MSFPLIAKTHOCQP-REWHXWOFAV	
SMILES	
[Ag]I	
Properties	
Chemical formula	AgI
Molar mass	234.77 g/mol
Appearance	yellow, crystalline solid
Odor	odorless
Density	5.675 g/cm^3, solid
Melting point	558 °C (1,036 °F; 831 K)
Boiling point	1,506 °C (2,743 °F; 1,779 K)
Solubility in water	3×10^{-7}g/100mL (20 °C)
Solubility product (K_{sp})	8.52×10^{-17}
Magnetic susceptibility (χ)	$-80.0 \cdot 10^{-6}$ cm^3/mol
Structure	
Crystal structure	hexagonal (β-phase, < 147 °C) cubic (α-phase, > 147 °C)
Thermochemistry	
Std molar entropy ($S^{\ominus}_{298}$)	115 J·mol^{-1}·K^{-1}[1]
Std enthalpy of formation ($\Delta_f H^{\ominus}_{298}$)	−62 kJ·mol^{-1}[1]
Hazards	
Safety data sheet	Sigma-Aldrich (http://www.sigmaald

	rich.com/MSDS/MSDS/DisplayMSDSPage.do?country=PL&language=EN-generic&productNumber=204404&brand=ALDRICH&PageToGoToURL=http%3A%2F%2Fwww.sigmaaldrich.com%2Fcatalog%2Fproduct%2Faldrich%2F204404%3Flang%3Dpl)
EU classification (DSD) *(outdated)*	not listed
NFPA 704 (fire diamond)	
Flash point	Non-flammable

Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).

✗ verify (what is ✓✗ ?)

Infobox references

HI																	He
LiI	BeI_2											BI_3	CI_4	NI_3	I_2O_4, I_2O_5, I_4O_9	IF, IF_3, IF_5, IF_7	Ne
NaI	MgI_2											AlI_3	SiI_4	PI_3, P_2I_4	S	ICl, ICl_3	Ar
KI	CaI_2	Sc	TiI_4	VI_3	CrI_3	MnI_2	FeI_2	CoI_2	NiI_2	CuI	ZnI_2	Ga_2I_6	GeI_2, GeI_4	AsI_3	Se	IBr	Kr
RbI	SrI_2	YI_3	ZrI_4	NbI_5	Mo	Tc	Ru	Rh	Pd	AgI	CdI_2	InI_3	SnI_4, SnI_2	SbI_3	TeI_4	I	Xe
CsI	BaI_2		HfI_4	TaI_5	W	Re	Os	Ir	Pt	AuI	Hg_2I_2, HgI_2	TlI	PbI_2	BiI_3	Po	AtI	Rn
Fr	RaI_2		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
		↓															
		La	Ce	Pr	Nd	Pm	SmI_2	Eu	Gd	TbI_3	Dy	Ho	Er	Tm	Yb	Lu	
		Ac	ThI_4	Pa	UI_3, UI_4	Np	Pu	Am	Cm	Bk	Cf	EsI_3	Fm	Md	No	Lr	